IN THE CLAIMS

The following listing of the claims is provided in accordance with 37 C.F.R. 1.121:

1. (currently amended) An in-situ laser plasma spectroscopy (LPS) apparatus, comprising:

an enclosure for housing a laser energy source;

a main fiber connected to said enclosure at a first end of said main fiber, and connected to a probe at a second end of said main fiber, said main fiber configured for transmitting input laser energy from said laser energy source to a target and for transmitting laser induced plasma emission signals back from said target; and

said probe being moveable with respect to said target and having a single focal lens for directing said input laser energy from said main fiber to said target, and for directing said laser induced plasma emission signals from said target to said main fiber.

2. (original) The LPS apparatus of claim 1, wherein said enclosure further includes a beam splitter for directing said input laser energy from said laser energy source into said main fiber, said beam splitter further configured for directing said laser induced plasma emission signals from said main fiber to a second fiber in communication with said enclosure, wherein said second fiber is configured to transmit said laser induced plasma emission signals to a spectrometer device for analysis of said laser induced plasma emission signals.

3. (original) The LPS apparatus of claim 2, wherein said enclosure further includes:

a first lens for focusing said input laser energy reflected from said beam splitter into said main fiber; and

a second lens for focusing said laser induced plasma emission signals directed from said beam splitter into said second fiber.

4. (original) The LPS apparatus of claim 3, wherein said second lens is positioned equidistant between said main fiber and said second fiber.

5. (original) The LPS apparatus of claim 4, wherein said second lens has a focal length of about 100 millimeters.

6. (original) The LPS apparatus of claim 2, wherein said beam splitter further comprises one of a short wavelength pass filter and a band-reflection filter.

7. (original) The LPS apparatus of claim 1, wherein said enclosure comprises a sealed enclosure.

8. (original) The LPS apparatus of claim 1, wherein said probe further comprises a stop at one end thereof, said stop configured such that an exit end of said probe corresponds to a focal point of said single focal lens.

9. (original) The LPS apparatus of claim 8, wherein said single focal lens has a focal length of about 12 millimeters.

10. (original) The LPS apparatus of claim 8, wherein said probe further comprises a depressible shutter for manually unblocking the emergence of input laser energy from said probe.

11. (original) The LPS apparatus of claim 8, wherein said probe further comprises an indicator for indicating said laser energy source is turned on.

12. (original) An in-situ laser plasma spectroscopy (LPS) apparatus, comprising:

an enclosure for housing a laser energy source;

a main fiber connected to said enclosure at a first end of said main fiber, and connected to a probe at a second end of said main fiber, said main fiber configured for transmitting input laser energy from said laser energy source to a target and for transmitting laser induced plasma emission signals back from said target;

said probe having a single focal lens for directing said input laser energy from said main fiber to said target, and for directing said laser induced plasma emission signals from said target to said main fiber; and

at least one satellite fiber attached within said probe, said at least one satellite fiber configured so as to transmit a portion of laser induced plasma emission signals back from said target.

13. (original) The LPS apparatus of claim 12, wherein said enclosure further includes a beam splitter for directing said input laser energy from said laser energy source into said main fiber, said beam splitter further configured for directing said laser induced plasma emission signals from said main fiber to a second fiber connected to said enclosure, wherein said second fiber is configured to transmit said laser induced plasma emission signals to a spectrometer device for analysis of said laser induced plasma emission signals.

14. (original) The LPS apparatus of claim 13, wherein said enclosure further includes:

a first lens for focusing said input laser energy reflected from said beam splitter into said main fiber; and

a second lens for focusing said laser induced plasma emission signals directed from said beam splitter into said second fiber.

15. (original) The LPS apparatus of claim 14, wherein said second lens is positioned equidistant between said main fiber and said second fiber.

16. (original) The LPS apparatus of claim 15, wherein said second lens has a focal length of about 100 millimeters.

17. (original) The LPS apparatus of claim 13, wherein said beam splitter further comprises one of a short wavelength pass filter and a band-reflection filter.

18. (original) The LPS apparatus of claim 12, wherein said enclosure comprises a sealed enclosure.

19. (original) The LPS apparatus of claim 12, wherein said probe further comprises a stop at one end thereof, said stop configured such that an exit end of said probe corresponds to a focal point of said single focal lens.

20. (original) The LPS apparatus of claim 19, wherein said single focal lens has a focal length of about 12 millimeters.

21. (original) The LPS apparatus of claim 19, wherein said probe further comprises a depressible shutter for manually unblocking the emergence of input laser energy from said probe.

22. (original) The LPS apparatus of claim 19, wherein said probe further comprises an indicator for indicating said laser energy source is turned on.

23. (original) The LPS apparatus of claim 19, wherein said probe further comprises a connector, said connector configured to maintain said at least one satellite fiber and said main fiber in a linear arrangement.

24. (original) The LPS apparatus of claim 19, wherein said probe further comprises a connector, said connector configured to maintain said at least one satellite fiber and said main fiber in a hexagonal arrangement.

25. (currently amended) An in-situ laser plasma spectroscopy (LPS) system, comprising:

an enclosure for housing a laser energy source;

a main fiber connected to said enclosure at a first end of said main fiber, and connected to a probe at a second end of said main fiber, said main fiber configured for transmitting input laser energy from said laser energy source to a target and for transmitting laser induced plasma emission signals back from said target;

said probe being moveable with respect to said target and having a single focal lens for directing said input laser energy from said main fiber to said target, and for directing said laser induced plasma emission signals from said target to said main fiber;

a beam splitter disposed within said enclosure, said beam splitter configured for directing said input laser energy from said laser energy source into said main fiber, said beam splitter further configured for directing said laser induced plasma emission signals from said main fiber to a second fiber connected to said enclosure;

a spectrometer device attached to said second fiber, said spectrometer device configured to receive said laser induced plasma emission signals for analysis of said laser induced plasma emission signals;

an intensified charge-coupled device (ICCD) camera attached to said spectrometer device; and

a computer in communication with said ICCD camera.

26. (original) The LPS system of claim 25, wherein said enclosure further includes:

a first lens for focusing said input laser energy reflected from said beam splitter into said main fiber; and

a second lens for focusing said laser induced plasma emission signals directed from said beam splitter into said second fiber.

27. (original) The LPS system of claim 26, wherein said second lens is positioned equidistant between said main fiber and said second fiber.

28. (original) The LPS system of claim 27, wherein said second lens has a focal length of about 100 millimeters.

29. (original) The LPS system of claim 25, wherein said beam splitter further comprises one of a short wavelength pass filter and a band-reflection filter.

30. (original) The LPS system of claim 25, wherein said enclosure comprises a sealed enclosure.

31. (currently amended) The LPS system of claim ~~24~~25, wherein said probe further comprises a stop at one end thereof, said stop configured such that an exit end of said probe corresponds to a focal point of said single focal lens.

32. (original) The LPS system of claim 31, wherein said single focal lens has a focal length of about 12 millimeters.

33. (original) The LPS system of claim 31, wherein said probe further comprises a depressible shutter for manually unblocking the emergence of input laser energy from said probe.

34. (original) The LPS system of claim 31, wherein said probe further comprises an indicator for indicating said laser energy source is turned on.

35. (currently amended) The LPS system of claim [24]25, wherein said main fiber is removably connectable to said enclosure and said probe, and said second fiber is removably connectable to said enclosure and said spectrometer through an associated fiber connector.

36. (currently amended) The LPS system of claim [24]25, wherein said second fiber has a same core size as said main fiber.

37. (currently amended) The LPS system of claim [24]25, wherein said second fiber further comprises a fiber bundle having a plurality of individual fibers, wherein said individual fibers are arranged in a circular configuration at the connection to said enclosure and arranged in a linear configuration at the connection to said spectrometer.

38. (original) The LPS system of claim 25, further comprising at least one satellite fiber in communication with said probe, said at least one satellite fiber configured so as to transmit a portion of laser induced plasma emission signals back from said target.

39. (original) The LPS system of claim 38, further comprising a shuttering system for blocking said input laser energy from said target upon detection of detection of one or more selected wavelengths from said laser induced plasma emission signals.

40. (original) The LPS system of claim 39, wherein said shuttering system further comprises:

a photomultiplier tube (PMT) detector for receiving a portion of laser induced plasma emission signals; and

a shutter disposed within said enclosure;